



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,143	09/20/2002	Xiaoguo Tang	201-1341	2762

32242 7590 09/08/2003

DYKEMA GOSSETT PLLC
315 EAST EISENHOWER PARKWAY
SUITE 100
ANN ARBOR, MI 48108-3306

EXAMINER

TRAN, BINH Q

ART UNIT	PAPER NUMBER
----------	--------------

3748

DATE MAILED: 09/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,143

Applicant(s)

TANG ET AL.

Examiner

BINH Q. TRAN

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6 and 8-18 is/are rejected.
- 7) ☒ Claim(s) 2-4,7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the amendment filed June 27, 2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 9-10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collier, Jr. (Collier) (Patent Number 6,405,720 B1) in view of Hansel (Patent Number 5,524,432).

Regarding claims 1, and 15, Collier discloses a hydrogen fueled reciprocating spark ignition engine (2), comprising: a fuel system for providing gaseous hydrogen to the cylinders of the engine (2); a catalytic converter (14) coupled to the engine for treating the engine's exhaust; an EGR system (10) for providing recirculated exhaust gas to the engine; and a controller for operating the fuel system and the EGR system during periodic purging of the catalytic converter such that the engine is operated at a richer-than stoichiometric air/fuel ratio, and with the mass of EGR approximating 40-80% of the mass of air and fuel (See col. 5, lines 17-67; col. 6, lines 1-67; col. 7, lines 1-14). However Collier fails to disclose that the catalytic converter is a NO_x catalyst.

Hansel teaches that it is conventional in the art, to use a catalytic converter (105) as a NO_x catalyst so that to reduce amount of NO_x in the exhaust gas emission (e.g. See col. 5, lines 10-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to a catalytic converter as a NO_x catalyst of Collier, as taught by Hansel for the purpose of reducing the amount of NO_x flowing into the NO_x catalyst, so as to further reduce amount of nitrogen oxides in the exhaust gas of the lean-burn engine and improve the performance of the engine and the efficiency of the NO_x catalyst.

Regarding claim 9, Hansel further discloses an NO_x sensor (119) mounted downstream from the lean NO_x trap, with said sensor generating a signal corresponding to the concentration of NO_x in the exhaust stream, and with said sensor being operatively connected with said controller (See Figures 1-6).

Regarding claim 10, Hansel further discloses comprising an SCR converter (107) mounted downstream from the lean NO_x catalyst (105) (e.g. See Fig. 1).

Claims 5-6, 12-13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collier in view of design choice.

Regarding claims 5-6, 12-13, and 16-18, Collier discloses all the claimed limitation as discussed above except the compression ratio of the engine is within the range of approximately 10:1-15:1, and an equivalence ratio of about 0.15 to 0.65.

Regarding the specific range of the compression ratio of the engine, it is the examiner's position that a range of approximately 10:1-15:1 of the compression ratio, and an equivalence ratio of about 0.15 to 0.65 of the engine would have been an obvious matter of design choice

well within the level of ordinary skill in the art, depending on variables such as the size of the engine, as well as mass flow rate of the exhaust gas, the engine operation conditions, and the controlled temperature of the catalytic converter. Moreover, there is nothing in the record which establishes that the claimed parameters present a novel or unexpected result (See *In re Kuhle*, 562 F. 2d 553, 188 USPQ 7 (CCPA 1975)).

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. *In re Dreyfus*, 22 CCPA (Patents) 830, 73 F.2d 931, 24 USPQ 52; *In re Waite et al.*, 35 CCPA (Patents) 1117, 168 F.2d 104, 77 USPQ 586. Such ranges are termed "critical" ranges, and the applicant has the burden of proving such criticality. *In re Swenson et al.*, 30 CCPA (Patents) 809, 132 F.2d 1020, 56 USPQ 372; *In re Scherl*, 33 CCPA (Patents) 1193, 156 F.2d 72, 70 USPQ 204. However, even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. *In re Sola*, 22 CCPA (Patents) 1313, 77 F.2d 627, 25 USPQ 433; *In re Normann et al.*, 32 CCPA (Patents) 1248, 150 F.2d 627, 66 USPQ 308; *In re Irmischer*, 32 CCPA (Patents) 1259, 150 F.2d 705, 66 USPQ 314. More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Swain et al.*, 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; *Minnesota Mining and Mfg. Co. v. Coe*, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; *Allen et al. v. Coe*, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

Claims 8, 11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collier in view of Oshima et al. (Oshima) (Patent Number 5,272,871).

Regarding claims 8, and 14, Collier discloses all the claimed limitation as discussed above except a three way catalyst mounted upstream of the lean NOx trap.

Oshima teaches that it is conventional in the art, to position a three-way catalyst (9) upstream of the lean NOx trap (12) so that to reduce amount of unburned hydrocarbon flow into the NOx trap (See Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to use a three-way catalyst (9) upstream of the lean NOx trap of Collier, as taught by Oshima for the purpose of reducing the amount of HC and CO flowing into the NOx catalyst, so as to further reduce amount of nitrogen oxides in the exhaust gas of the lean-burn engine and improve the performance of the engine and the efficiency of the NOx catalyst.

Regarding claim 11, Collier further discloses an auxiliary fuel system (e.g. 10, 11) for providing hydrogen to the engine's exhaust system (8) upstream of the lean NOx trap (12) (See Figs. 1-26).

Allowable Subject Matter

Claims 2-4, and 7, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Since allowable subject matter has been indicated, applicant is encouraged to submit formal drawings in response to this Office action. The early submission of formal drawings will permit the Office to review the drawings for acceptability and to resolve any informalities remaining therein before the application is passed to issue. This will avoid possible delays in the issue process.

Response to Arguments

Applicant's arguments filed June 27, 2003 have been fully considered but they are not completely persuasive. ***Claims 1-18 are pending.***

Applicant's cooperation in correcting the informalities in the specification is appreciated. Applicant's cooperation in explaining the claims subject matter more specific to overcome the claim objections relating to indefinite claim language is also appreciated.

Applicants' s arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection as discussed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Binh Tran whose telephone number is (703) 305-0245. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reach on (703) 308-2623. The fax phone number for this group is (703) 746-4561.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

A handwritten signature in black ink, appearing to read 'Binh Tran', with a long, sweeping horizontal line extending to the right.

BT
September 04, 2003

Binh Tran
Patent Examiner
Art Unit 3748